

Amendments To The Claims

The following list of the claims replaces all prior versions and lists of the claims in this application.

1. (Currently amended) A mass spectrometer pumping device for supplying a diluted sample to a mass spectrometric analyser, comprising:

a first conduit for a sample;

a second conduit for a diluent;

a third conduit for a diluted sample;

a mixer arranged to ~~mix a~~ mix the sample ~~with a~~ from the first conduit with the diluent from the second conduit to form the diluted sample, said mixer being ~~disposed between a~~ coupled to the first ~~and a~~ conduit and the second conduit such that, ~~in use, a~~ the sample enters the mixer through the first conduit at a first flow rate ~~and a~~ and the diluent enters the mixer through the second conduit at a second flow rate, the mixer being coupled to the third conduit and arranged so that said diluted sample exits the mixer ~~through a~~ into the third conduit at a third flow rate, said third flow rate being substantially equal to the sum of the first and second flow rates;

pump means for pumping fluid through the mixer and ~~into the analyser~~ the third conduit, the pump means comprising:

a pump ~~disposed on~~ coupled to the third conduit; and

a valve, or variable constriction, disposed in one of the first and second conduits and arranged to control the first or second flow rate respectively; and

a pump controller arranged to receive analyzer data ~~from the analyser~~ indicative of the amount by which the sample is diluted and to control the pump means so that any of the first, second or third flow rates are adjustable with respect to one another in dependence upon the received data.

2. (Previously presented) A device according to claim 1, wherein both the first and second conduits have a respective valve, or variable constriction, disposed therein and arranged to control the first and second flow rate respectively.

3. (Currently amended) A device according to claim 1, wherein the controller is arranged to receive the analyzer data in real time ~~from the analyser~~ for real time adjustment of the pump means.

4. (Original) A device according to claim 1, wherein a dilution factor by which the sample is diluted is calculable from the ratio of the first and second flow rates, and the controller is arranged to adjust the dilution factor by controlling one or more of the pump means.

5. (Original) A device according to claim 1, wherein either the sample or the diluent contain an internal standard which comprises a predetermined amount of a known substance, and a dilution factor by which the sample is diluted is calculable by comparing the detected amount of said internal standard by the analyser with the amount of internal standard in the sample or diluent.

6. (Currently amended) A device according to claim 1, wherein the pump is arranged for substantially constant flow of the diluted sample ~~to the analyser~~ through the third conduit.

7. (Previously presented) A device according to claim 6, wherein the controller is arranged to adjust the dilution factor by controlling the valve, or variable constriction.

8. (Canceled).

9. (Original) A device according to claim 1, wherein the analyser is an inductively coupled plasma mass spectrometer.

10. (Currently amended) An apparatus comprising:
a mass spectrometer for analysing a sample, comprising and
a pumping device according to claim 1.

11. (Previously presented) A method for diluting a sample prior to performing mass spectrometry on the sample in an analyser, using a pump system comprising:

a first pump means,
a diluent for diluting the sample,
a mixer for mixing the sample and diluent,
a first conduit disposed between a sample container and the mixer,
a second conduit disposed between a diluent container and the mixer, and
a third conduit disposed between the mixer and the analyser,

wherein the pump means comprises a valve, or variable constriction, disposed in one of the first and second conduits to control the first or second flow rate respectively and a pump disposed on the third conduit to draw sample through the mixer,

so that the flow rate of diluted sample along the third conduit is substantially the sum of the flow rate of diluent along the second conduit and the flow rate of sample along the first conduit, and a controller controls the pumps means to adjust the first, second or third flow rates with respect to one another in dependence upon data received from the analyser indicative of the amount by which the sample is diluted.

12. (Original) A method according to claim 11, wherein the flow rates can be adjusted in real time.

13. (Original) A method according to claim 11, wherein the third rate is substantially constant and a dilution factor is adjustable by varying the first and/or second flow rates.

14. (Previously presented) A method according to claim 11, further comprising, when another sample requires dilution, the additional steps of:

- i) replacing the sample container with the another sample container containing a second sample;
- ii) varying the first rate to substantially the third flow rate for a predetermined time; and
- iii) after the predetermined time, reducing to the first rate so that the sample is diluted by a dilution factor;

wherein the predetermined time is substantially the time taken for the second sample to be transferred from the another container to the mixer at the first rate.

15. (Original) A method according to claim 11, further comprising:
disposing an internal standard into the sample, said internal standard comprising a known concentration of a predetermined substance, and
determining the factor by which the sample is diluted by comparing the detected concentration of the internal standard with the known concentration of the internal standard in the undiluted sample.

16. (Original) A method according to claim 15, wherein a second internal standard comprising a known concentration of a second predetermined substance is disposed in the sample and the diluent at the same second concentration levels.

17. (Original) A method according to claim 15, further comprising:
determining the dilution factor from the amount of the first internal standard detected by the analyser,

determining a correction factor by comparing the determined dilution factor with an expected dilution factor, and
using the correction factor to correct analyser data.

18. (Original) A computer program which, when run on a computer, carries out the method according to claim 11.

19. (Original) An electronic carrier means on which is stored the computer program according to claim 18.

Claims 20-25 (Canceled).

26. (Previously presented) A method of supplying a diluted sample to a mass spectrometric analyser for analysis, comprising:

diluting a sample supplied through a first conduit by mixing said sample with a diluent supplied through a second conduit in a mixer,

pumping said diluted sample to the analyser from the mixer, and

controlling the dilution factor by which the sample is diluted by controlling the flow rate of the sample and/or diluent to the mixer using a valve, or a variable constriction, disposed in the first or second conduit,

wherein the controlling of the dilution factor step is
carried out in response to data received by a pump controller from the analyser.

27. (Original) A method according to claim 26, wherein the data is received in substantially real time from the analyser.

28. (Previously presented) A method according to claim 26, further comprising:

disposing an internal standard into the sample, said internal standard comprising a known concentration of a predetermined substance, and

determining the factor by which the sample is diluted by comparing the detected concentration of the internal standard with the known concentration of the internal standard in the undiluted sample.

29. (Original) A method according to claim 28, wherein a second internal standard comprising a known concentration of a second predetermined substance is disposed in the sample and the diluent at the same second concentration levels.

30. (Original) A method according to claim 28, further comprising;
determining the dilution factor from the amount of the first internal standard detected by the analyser,

determining a correction factor by comparing the determined dilution factor with an expected dilution factor, and

using the correction factor to correct analyser data.

31. (Original) A computer program which, when run on a computer, carries out the method according to claim 26.

32. (Original) An electronic carrier means on which is stored the computer program according to claim 31.

Claims 33-53 (Canceled).

54. (Previously presented) A device according to claim 4, wherein the pump controller is arranged to provide a predetermined, initial dilution factor for the sample, and to increase or

reduce the dilution factor to a second dilution factor based on initial analysis data received by the pump controller.

55. (Previously presented) A method according to claim 11, wherein both the first and second conduits have a respective valve, or variable constriction, disposed therein and arranged to control the first and second flow rate respectively.

56. (Previously presented) A method according to claim 26, wherein both the first and second conduits have a respective valve, or variable constriction, disposed therein and the dilution factor is controlled using the first and second valves, or variable constrictions.

57. (Currently amended) A mass spectrometer pumping device for supplying a diluted sample to a mass spectrometric analyser, comprising:

- a mixer for mixing a sample with a diluent;
- a first conduit for supplying a sample to the mixer at a first flow rate;
- a second conduit for supplying a diluent to the mixer at a second flow rate; and
- a third conduit for receiving a diluted sample from the mixer; and comprising a pump disposed thereon for pumping the diluted sample from the mixer to a mass spectrometric analyser through the third conduit at a third flow rate substantially equal to the sum of the first and second flow rates, wherein one of the first and second conduits comprises a valve, or variable constriction, disposed therein for controlling the first or second flow rate, respectively.

58. (Previously presented) A method of supplying a diluted sample to a mass spectrometric analyser for analysis, comprising:

- diluting a sample supplied along a first conduit by mixing said sample with a diluent supplied along a second conduit in a mixer; and

pumping said diluted sample to the analyser from the mixer,
wherein the dilution of the sample is controlled using a valve, or variable constriction, disposed
in the first or second conduit.

59. (Previously presented) A device according to claim 54, wherein the initial dilution
factor is 100.